CLAIMS

We claim:

1. A receiver comprising:

a photodiode that translates an optical signal into an electrical signal;

a first amplifier, coupled to the photodiode, that receives the electrical signal and provides a first signal;

a converter, coupled to the first amplifier, that performs a linear-to-logarithmic conversion of the first signal to provide an output signal; and

an analog-to-digital converter that converts the output signal to a digital output signal.

2. The receiver of Claim 1, wherein the first amplifier provides a current to voltage conversion with a voltage level that is proportional to the average optical power received by the photodiode.

3. The receiver of Claim 1, wherein the converter provides the output signal, represented by ΔV_{BE}, having a value defined by at least one of the following equations,

$$\Delta V_{BE} = (n \bullet K \bullet T/q) \bullet \ln(I_1/I_2),$$

$$\Delta V_{BE} = (n \bullet K \bullet T/q) \bullet \ln(V_{DC}/V_{REF}),$$

$$\Delta V_{BE} = C \bullet \log_{10}(V_{DC}/V_{REF}), \text{ with } C = 2.3 \bullet n \bullet K \bullet T/q \text{ and}$$

where I_1, I_2 and V_{DC}, V_{REF} are values of current flowing through and voltage at a terminal, respectively, of at least one of a transistor and a diode.

4. The receiver of Claim 3, wherein the analog-to-digital converter provides the digital output signal, which is based on a difference in the measurement of the output signal when I_1 or V_{DC} is applied and then when I_2 or V_{REF} is applied.

5. The receiver of Claim 1, further comprising a second amplifier, coupled to the photodiode, which converts the electrical signal into a second signal that contains a data stream.

6. The receiver of Claim 5, wherein the first amplifier and the second amplifier are operational amplifiers.

7. The receiver of Claim 1, further comprising an optical fiber coupled to the photodiode and providing the optical signal.

8. The receiver of Claim 1, wherein the converter performs the linear-to-logarithmic conversion by utilizing the logarithmic relationship between a base-emitter voltage and a collector current of a transistor.

9. The receiver of Claim 1, wherein the converter performs the linear-to-logarithmic conversion by utilizing the logarithmic relationship of a voltage and a current of a diode.

10. The receiver of Claim 1, wherein the first signal is a direct current voltage signal that is proportional to an average power of the electrical signal.

11. The receiver of Claim 1, wherein the converter comprises:

a second amplifier that receives the first signal and a reference signal and provides alternatively a second signal corresponding to the first signal and a third signal corresponding to the reference signal;

a first transistor coupled to the second amplifier;

a resistor coupled to the first transistor and to the second amplifier;

a second transistor;

a current mirror coupled to the first transistor and to the second transistor, the current mirror providing a current through the second transistor having a value of the first signal divided by the value of the resistor, when the second amplifier provides the second signal, and the reference signal divided by the value of the resistor when the second amplifier provides the third signal to provide the output signal which is a difference in values at a terminal of the second transistor determined by the first signal and the reference signal.

12. The receiver of Claim 1, wherein the converter comprises:

a second amplifier that receives the first signal and a reference signal and provides alternatively a second signal corresponding to the first signal and a third signal corresponding to the reference signal;

a first transistor coupled to the second amplifier;

a resistor coupled to the first transistor and to the second amplifier;

a second transistor coupled to the first transistor; and

a third transistor coupled to the second transistor, wherein the current through the third transistor is proportional to a value of the first signal divided by the value of the resistor, when the second amplifier provides the second signal, and to a value of the reference signal divided by the value of the resistor when the second amplifier provides the third signal to provide the output signal which is a difference in values at a terminal of the second transistor determined by the first signal and the reference signal.

13. A receiver comprising:

means for receiving an optical signal and converting the optical signal to an electrical signal;

means for performing a linear-to-logarithmic conversion of the electrical signal to provide a first signal; and

means for converting the first signal from an analog to a digital format to provide an output signal.

14. The receiver of Claim 13, wherein the output signal reports a relative strength of the optical signal in logarithmic units.

15. The receiver of Claim 13, wherein the means for performing employs a logarithmic relationship between a base-emitter voltage and a collector current of a transistor.

16. The receiver of Claim 13, wherein the means for performing employs a logarithmic relationship between a voltage and a current of a diode.

17. A method of measuring optical power, the method comprising:

receiving an optical signal;

converting the optical signal to an electrical signal; and

performing a linear-to-logarithmic conversion on the electrical signal to provide an output signal.

18. The method of Claim 17, further comprising performing an analog-to-digital conversion on the output signal to provide a digital signal indicating the relative strength of the optical signal in logarithmic units.

19. The method of Claim 17, wherein the linear-to-logarithmic conversion comprises converting the electrical signal to a direct current voltage signal that is proportional to an optical power of the optical signal and converting the direct current voltage signal from linear values to logarithmic values to provide the output signal.

20. The method of Claim 17, wherein the output signal, represented by ΔV_{BE}, has a value defined by at least one of the following equations,

$$\Delta V_{BE} = (n \bullet K \bullet T/q) \bullet \ln(I_1/I_2),$$

$$\Delta V_{BE} = (n \bullet K \bullet T/q) \bullet \ln(V_{DC}/V_{REF}),$$

$$\Delta V_{BE} = C \bullet \log_{10}(V_{DC}/V_{REF}), \text{ with } C = 2.3 \bullet n \bullet K \bullet T/q \text{ and}$$

where I_1, I_2 and V_{DC}, V_{REF} are values of current flowing through and voltage at a terminal, respectively, of at least one of a transistor and a diode.